Clinical Laboratory COVID-19 Response Call

Monday, January 10, 2022, at 3:00 PM EDT

- **Welcome**
  - Jasmine Chaitram, CDC Division of Laboratory Systems (DLS)
- **Evaluation of a SARS-CoV-2 Antigen Test in a Community Setting**
  - Jessica Prince-Guerra, CDC Division of Viral Diseases (DVD)
- **The TRUU-Lab Names Initiative: Towards Standardization, Interoperability, and Understanding**
  - Ila Singh, Texas Children's Hospital
- **FDA Update**
  - Tim Stenzel, US Food and Drug Administration (FDA)
- **SARS-CoV-2 Variants Update**
  - Natalie Thornburg, CDC Laboratory and Testing Task Force for the COVID-19 Response

Division of Laboratory Systems (DLS)

Vision

Exemplary laboratory science and practice advance clinical care, public health, and health equity.

Mission

Improve public health, patient outcomes, and health equity by advancing clinical and public health laboratory quality and safety, data and biorepository science, and workforce competency.

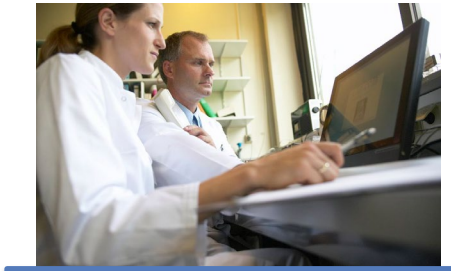
Four Goal Areas

Quality Laboratory Science

- Improve the quality and value of laboratory medicine and biorepository science for better health outcomes and public health surveillance

Highly Competent Laboratory Workforce

- Strengthen the laboratory workforce to support clinical and public health laboratory practice



Safe and Prepared Laboratories

- Enhance the safety and response capabilities of clinical and public health laboratories

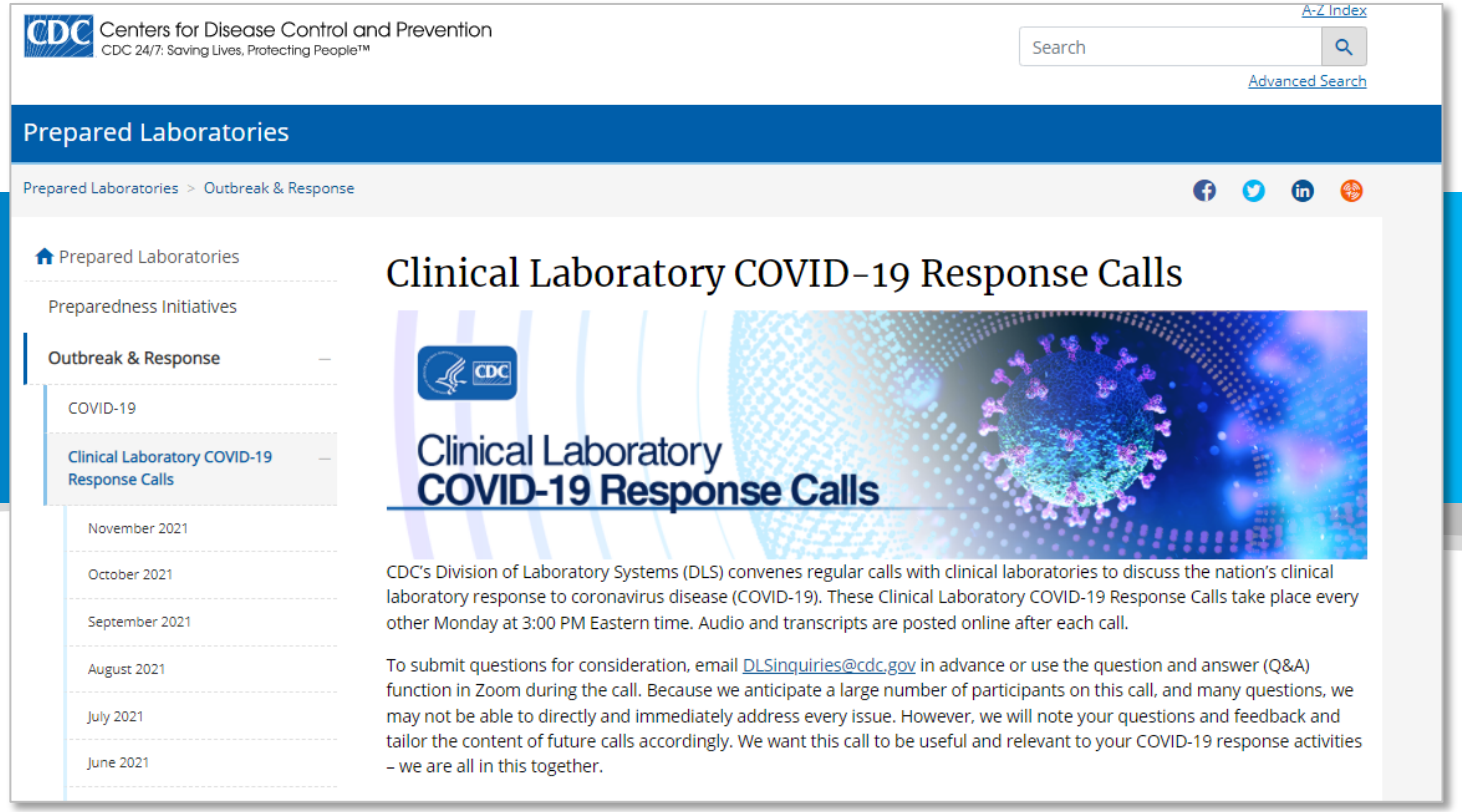
Accessible and Usable Laboratory Data

- Increase access and use of laboratory data to support response, surveillance, and patient care

CDC Preparedness Portal

https://www.cdc.gov/csels/dls/preparedlabs/covid-19-clinical-calls.html

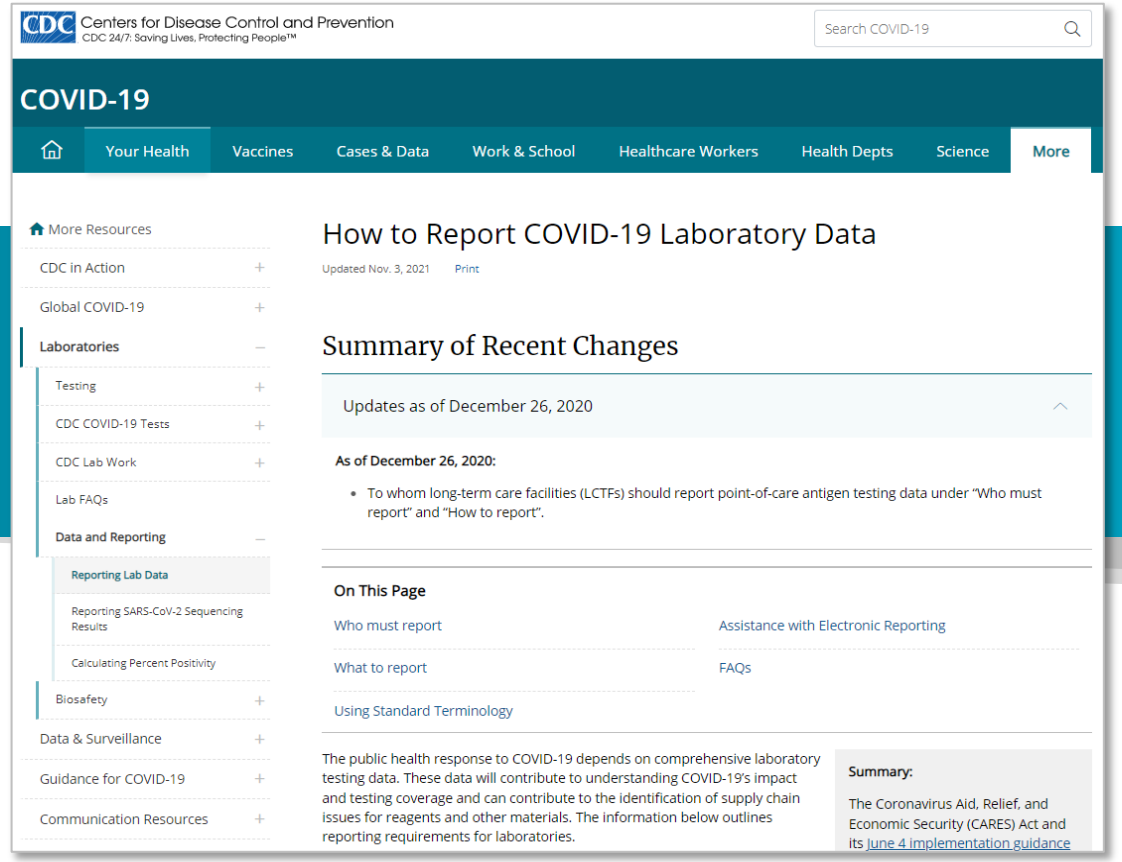
Find CLCR call information, transcripts, and audio recordings on this page



CDC COVID-19 Data Reporting

https://www.cdc.gov/coronavirus/2019-ncov/lab/reporting-lab-data.html

"Ask on order entry" (AOE) questions are optional, however, core data elements are important



Next Scheduled CLCR Call

The next call will be on **Monday, January 24**

from **3:00 PM to 4:00 PM ET**

We Want to Hear from You!

Training and Workforce Development

Questions about education and training?

Contact LabTrainingNeeds@cdc.gov

How to Ask a Question

- **Using the Zoom Webinar System**
  - Click the **Q&A** button in the Zoom webinar system
  - Type your question in the **Q&A** box and submit it
  - Please do not submit a question using the chat button

- For media questions, please contact CDC Media Relations at media@cdc.gov
- If you are a patient, please direct any questions to your healthcare provider

Slide decks may contain presentation material from panelists who are not affiliated with CDC. Presentation content from external panelists may not necessarily reflect CDC's official position on the topic(s) covered.

Evaluation of a SARS-CoV-2 Antigen Test in a Community Setting

Jessica Prince-Guerra, PhD

Laboratory Leadership Service Fellow

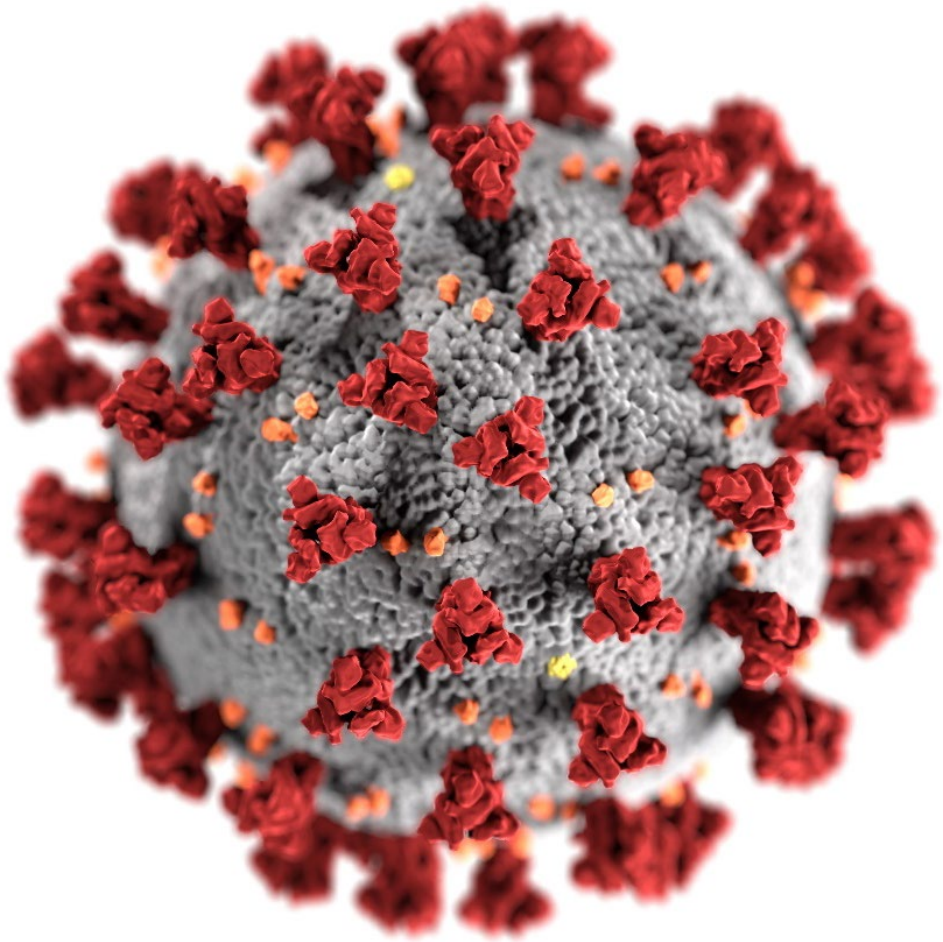
CDC, Division of Viral Diseases

CDC's Division of Laboratory Systems

Clinical Laboratory COVID-19 Response Call

January 10th, 2022

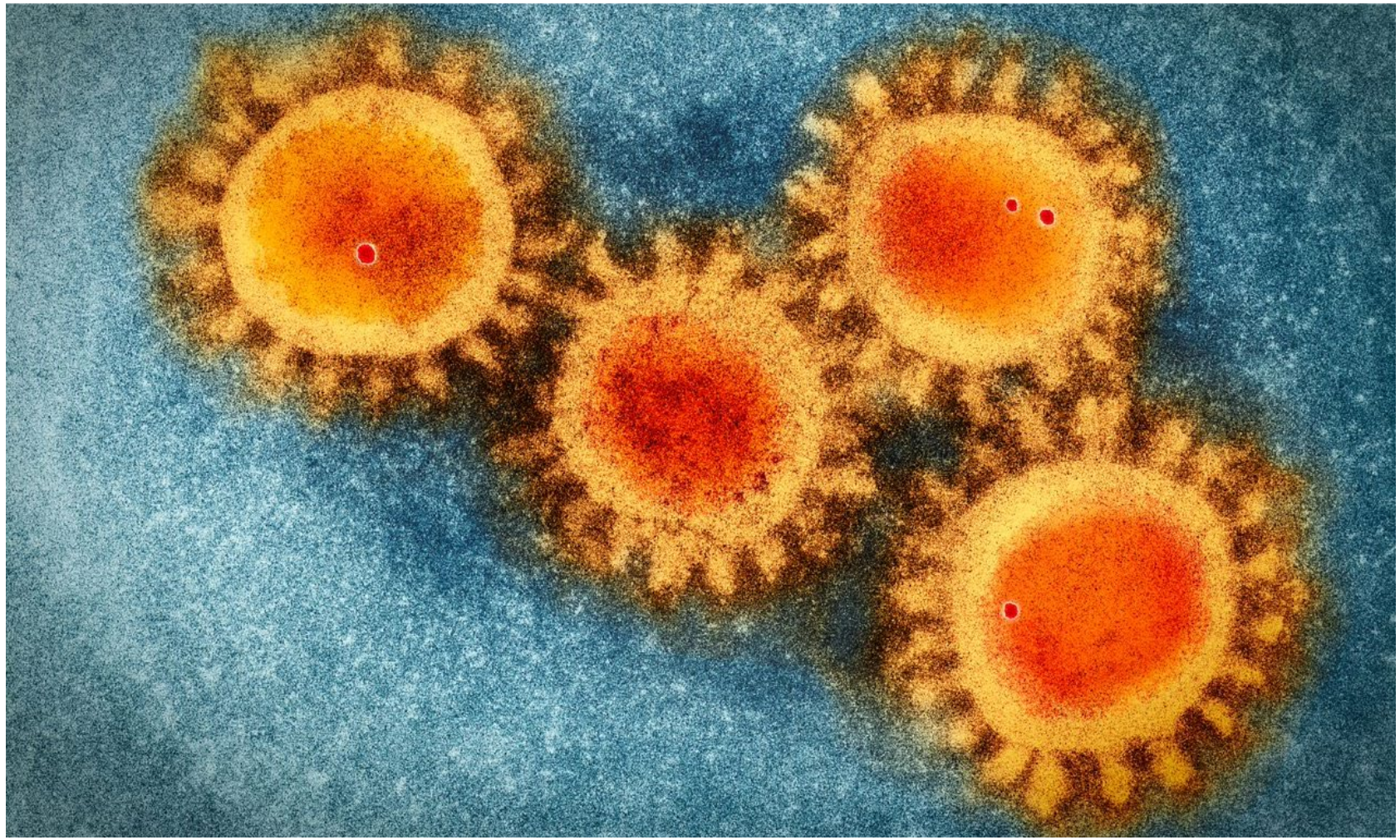
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention



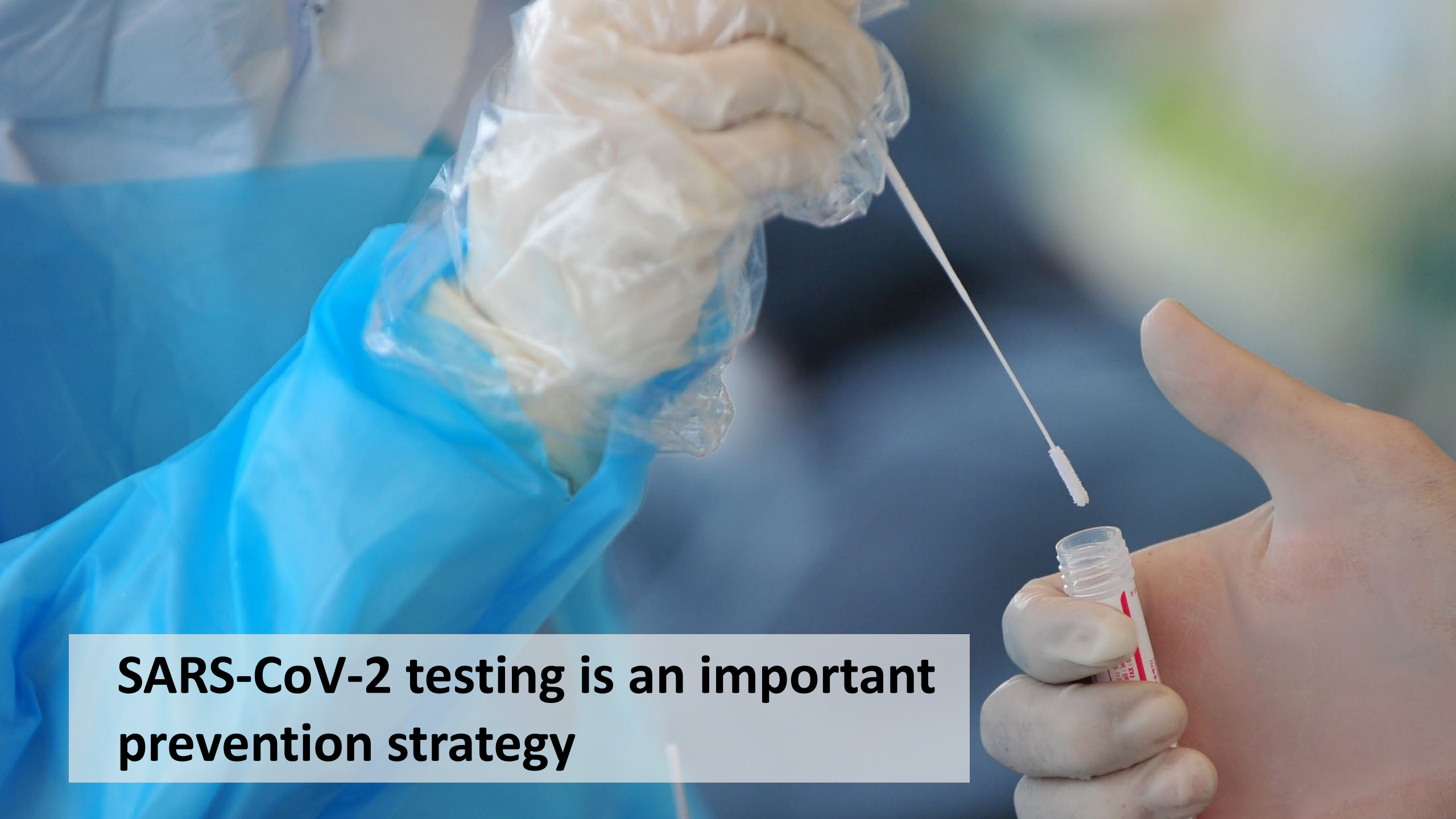
cdc.gov/coronavirus

Overview

- Background
- Purpose
- Methods
- Results
- Discussion

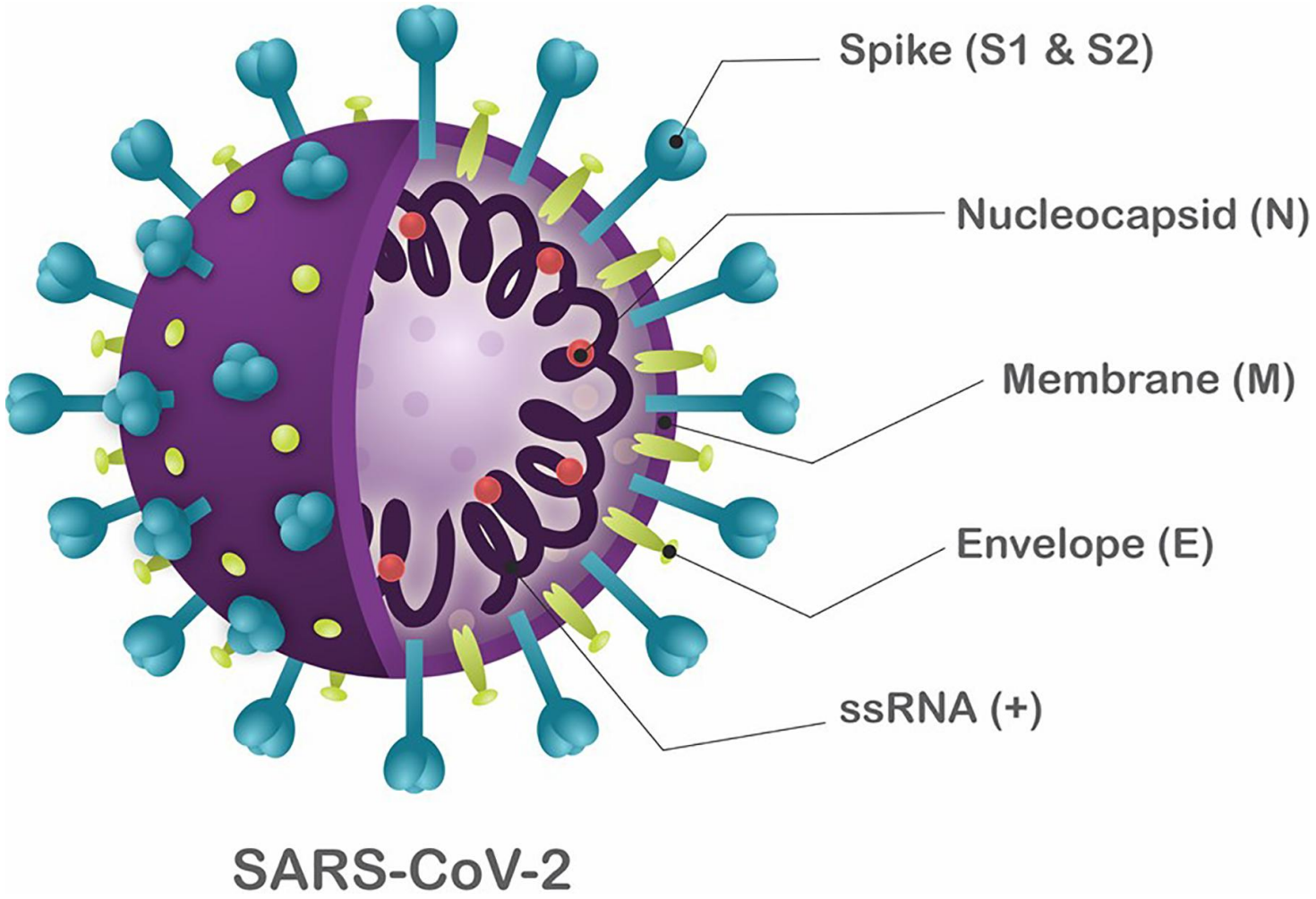


Background



SARS-CoV-2 testing is an important prevention strategy

SARS-CoV-2 rapid antigen tests detect viral proteins



Santos et al., 2020 Front. Microbiol.

BinaxNOW™ COVID-19 Ag Card for SARS-CoV-2 Detection received FDA Emergency Use Authorization (EUA) in August 2020

https://www.fda.gov/media/141567/download
https://www.fda.gov/media/141570/download
https://www.prnewswire.com/news-releases/abbotts-fast-5-15-minute-easy-to-use-covid-19-antigen-test-receives-fda-emergency-use-authorization-mobile-app-displays-test-results-to-help-our-return-to-daily-life-ramping-production-to-50-million-tests-a-month-301119289.html
https://www.bloomberg.com/news/articles/2021-02-05/abbott-went-all-in-on-covid-tests-and-it-s-just-getting-started

FDA EUA validation data only included 102 individuals within 7 days of symptom onset

BinaxNOW™ COVID-19 Ag Card	Comparator Method		
	Positive	Negative	Total
Positive	34	1	35
Negative	1	66	67
Total	35	67	102
Positive Agreement: 34/35	97.1% (95% CI: 85.1% - 99.9%)		
Negative Agreement: 66/67	98.5% (95% CI: 92.0% - 100%)		

https://www.fda.gov/media/141567/download
https://www.fda.gov/media/141570/download

Purpose

The **purpose of this evaluation** was to **assess the performance** of the BinaxNOW antigen test compared to real-time RT-PCR in **symptomatic and asymptomatic** persons at community testing sites.

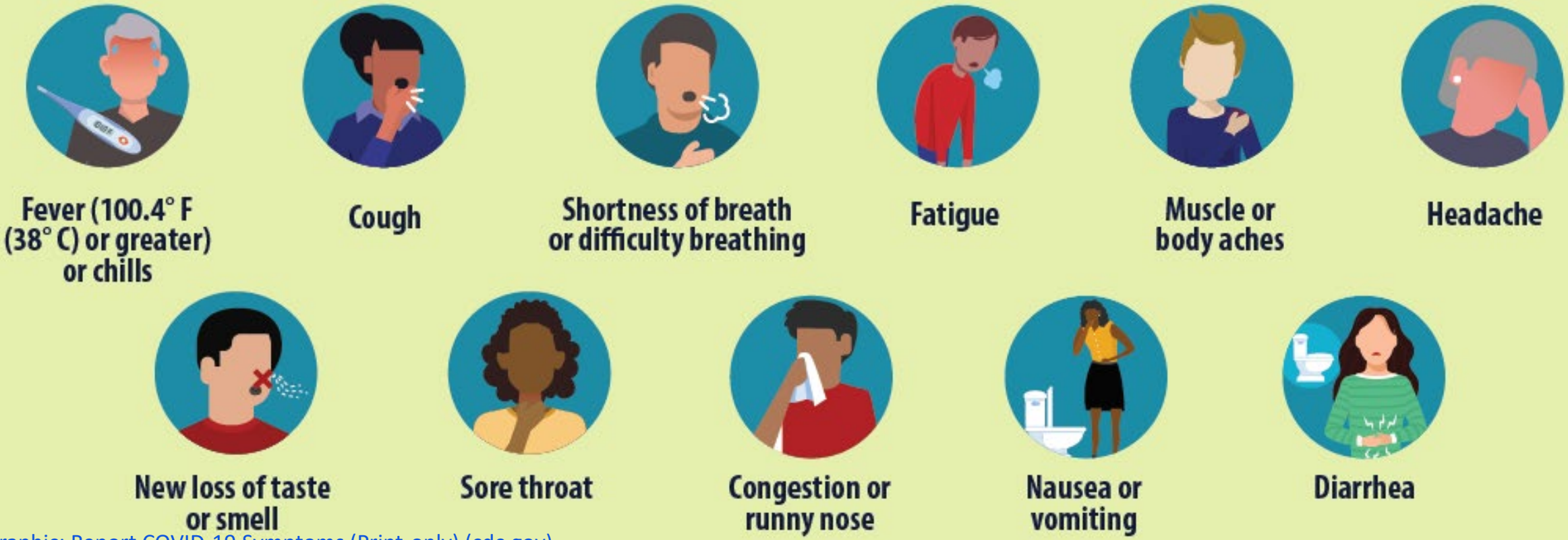
Methods

Recruited 3,419 participants ≥ 10 years of age for paired antigen and rRT-PCR testing from two community-based testing sites in

Pima County, Arizona - November 2020

Survey administered to participants

- Symptoms and days post onset
- Exposure to a diagnosed COVID-19 case
- Demographics – Pima County Health Department



Infographic: Report COVID-19 Symptoms (Print-only) (cdc.gov)

Sample collection

- Paired samples collected by healthcare professional
- First: bilateral nasal swab according to BinaxNOW instructions for use
- Second: bilateral nasopharyngeal swab (for rRT-PCR test)

Laboratory testing

- BinaxNOW point-of-care antigen testing
  - Positive results reported to participants by phone

- Real-time RT-PCR testing
  - Commercial laboratory
  - CDC 2019-nCoV rRT-PCR Diagnostic Panel for detection of SARS-CoV-2
  - Fosun COVID-19 rRT-PCR Detection Kit

- Positives from either test (n=274) tested by viral culture

BinaxNOW COVID-19 Ag Card and NAVICA App Set-Up and Training | Abbott Point of Care Testing (globalpointofcare.abbott)

Results

Participant characteristics – 3,419 paired results

- Participants aged 10 - 95 years (median = 41)
  - 2,592 (76%) asymptomatic; 827 (24%) with ≥ 1 symptom
- Race/ethnicity
  - Nearly one-third self-reported ethnicity as Hispanic or Latino
  - Half self-reported race/ethnicity as White, Non-Hispanic
- Asymptomatic
  - 1.9% positive by antigen test; 4.7% positive by real-time RT-PCR
- Symptomatic
  - 13.7% positive by antigen test; 21.3% positive by real-time RT-PCR

Prince-Guerra JL, Almendares O, Nolen LD, et al. Evaluation of Abbott BinaxNOW Rapid Antigen Test for SARS-CoV-2 Infection at Two Community-Based Testing Sites - Pima County, Arizona, November 3-17, 2020MMWR Morb Mortal Wkly Rep **2021**; 70(3): 100-5.

Time to results

BinaxNOW

2.5 hours

rRT-PCR

26 hours

Almendares O, Prince-Guerra JL, Nolen LD, et al. Performance characteristics of the Abbott BinaxNOW SARS-CoV-2 antigen test in comparison to real-time RT-PCR and viral culture in community testing sites during November 2020. J Clin Microbiol **2021**: JJCM0174221

BinaxNOW antigen test performance

Symptomatic

	PCR +	PCR -	
Binax +	113	0	113
Binax -	63	651	714
	176	651	827

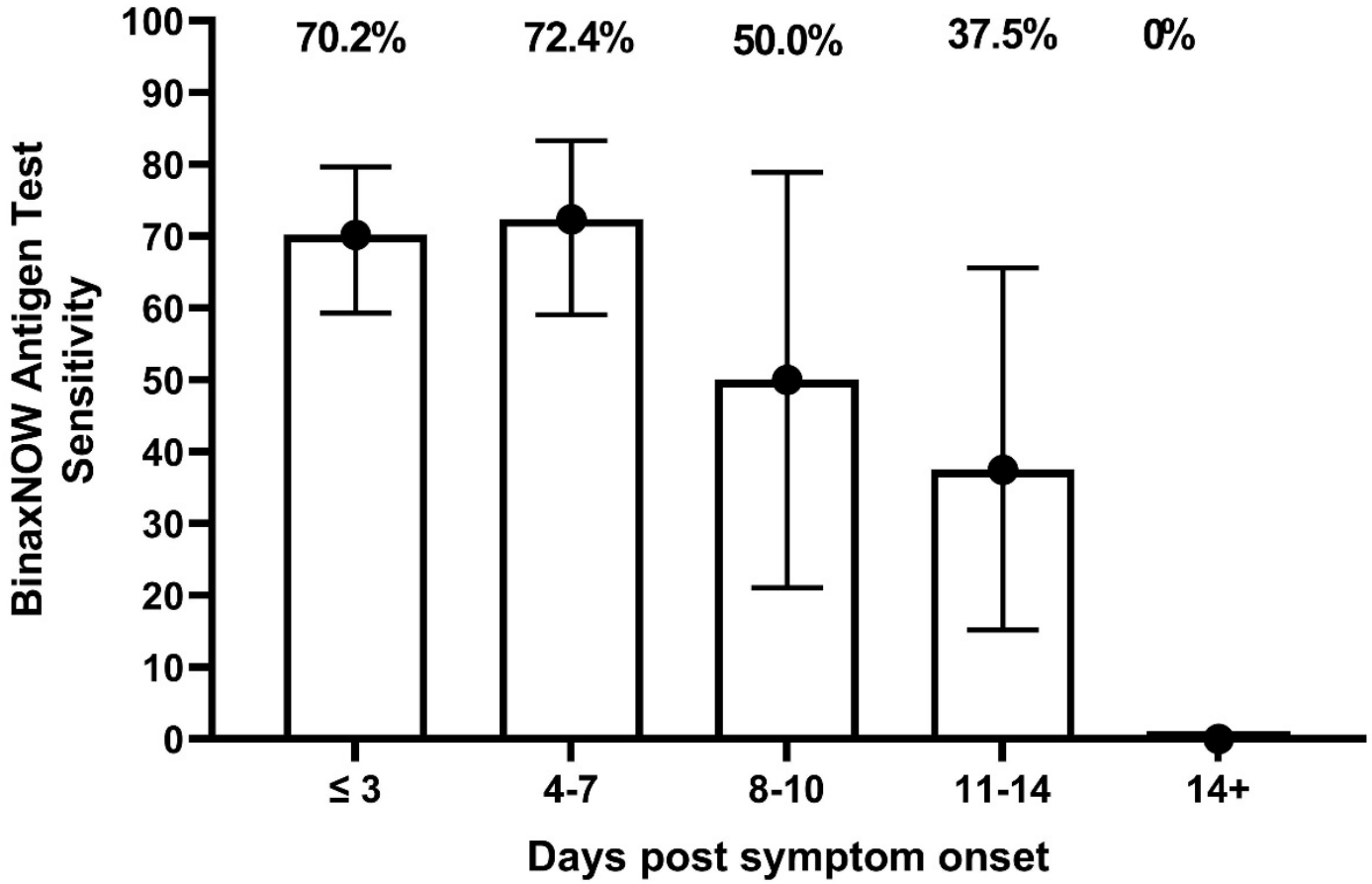
Asymptomatic

	PCR +	PCR -	
Binax +	44	4	48
Binax -	79	2465	2544
	123	2469	2854

	Symptomatic		Asymptomatic	
Sensitivity	113/176	64.2%	44/123	35.8%
Specificity	651/651	100%	2465/2469	99.8%
PPV	113/113	100%	44/48	91.7%
NPV	651/714	91.2%	2465/2544	96.9%

Prince-Guerra JL, Almendares O, Nolen LD, et al. Evaluation of Abbott BinaxNOW Rapid Antigen Test for SARS-CoV-2 Infection at Two Community-Based Testing Sites - Pima County, Arizona, November 3-17, 2020MMWR Morb Mortal Wkly Rep **2021**; 70(3): 100-5.

BinaxNOW antigen test performance is highest within 7 days of symptom onset



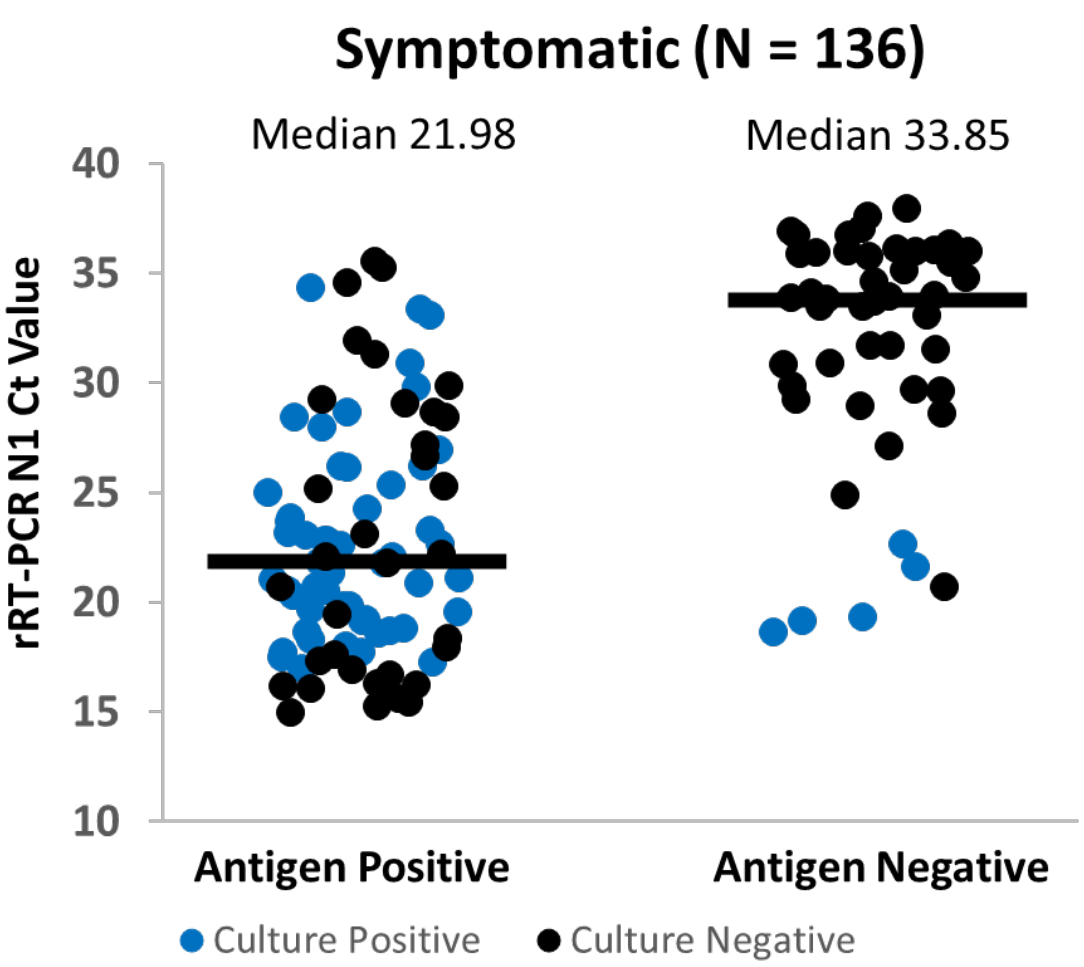
Almendares O, Prince-Guerra JL, Nolen LD, et al. Performance characteristics of the Abbott BinaxNOW SARS-CoV-2 antigen test in comparison to real-time RT-PCR and viral culture in community testing sites during November 2020. J Clin Microbiol **2021**: JJCM0174221

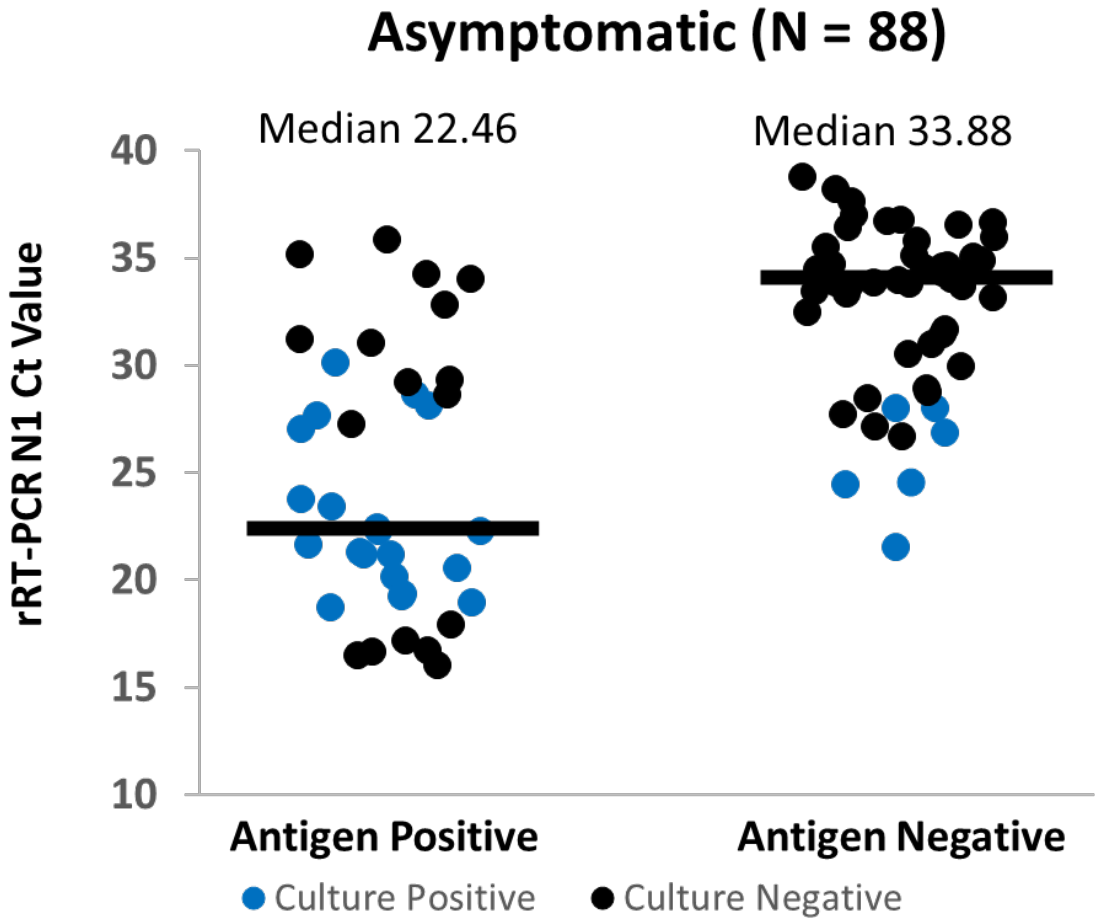
Viral culture results in samples positive by either test

Sample Categories	Virus Recovered N (%)	Total
All positive samples	96 (35%)	274
Antigen Positive, rRT-PCR Positive	85 (57.8%)	147
Antigen Negative, rRT-PCR Positive	11 (8.9%)	124
Antigen Positive, rRT-PCR Negative	0 (0%)	3

Prince-Guerra JL, Almendares O, Nolen LD, et al. Evaluation of Abbott BinaxNOW Rapid Antigen Test for SARS-CoV-2 Infection at Two Community-Based Testing Sites - Pima County, Arizona, November 3-17, 2020MMWR Morb Mortal Wkly Rep **2021**; 70(3): 100-5.

Samples with lower cycle threshold values were more likely to be concordant



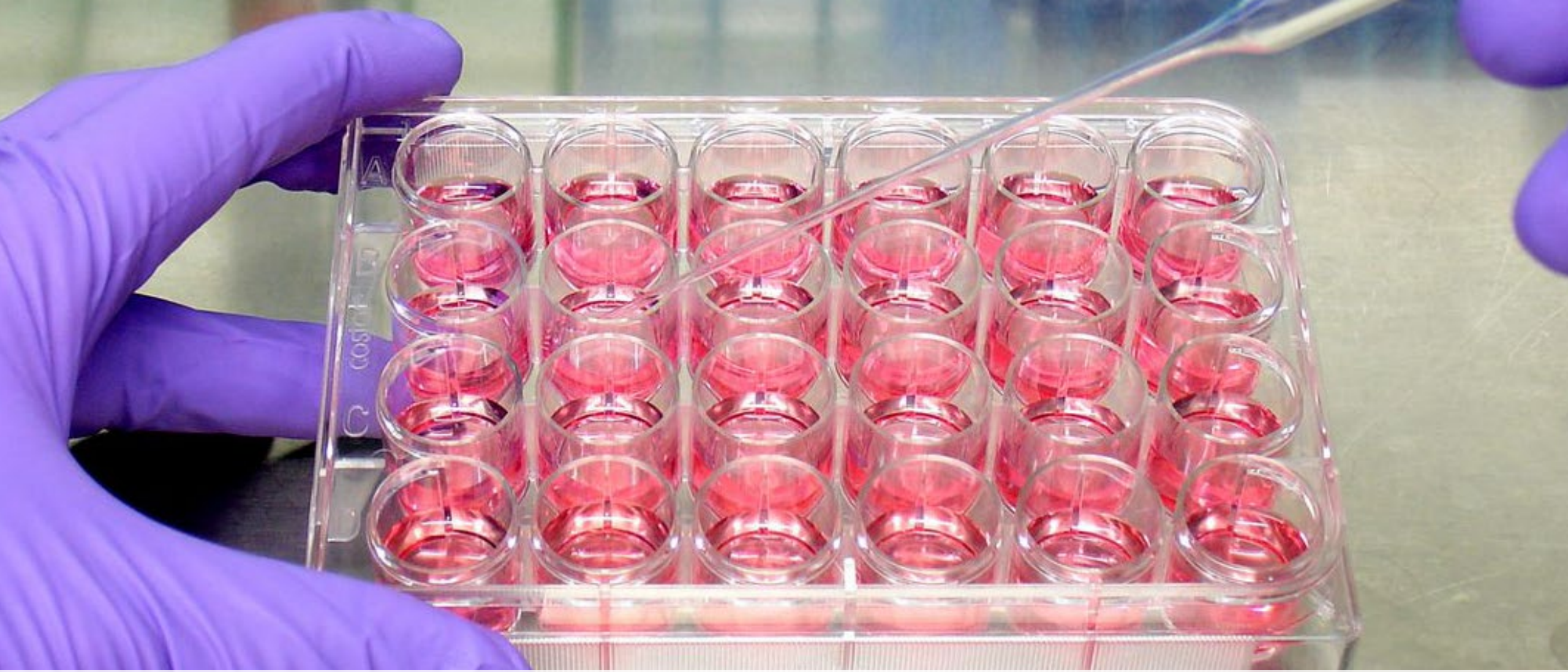


Prince-Guerra JL, Almendares O, Nolen LD, et al. Evaluation of Abbott BinaxNOW Rapid Antigen Test for SARS-CoV-2 Infection at Two Community-Based Testing Sites - Pima County, Arizona, November 3-17, 2020MMWR Morb Mortal Wkly Rep **2021**; 70(3): 100-5.

BinaxNOW antigen test sensitivity improved in culture positive samples

	Symptomatic	Asymptomatic
Total	68	28
Antigen Positive, rRT-PCR Positive	63	22
Antigen Negative, rRT-PCR Positive	5	6
Sensitivity	92.6%	78.6%

Prince-Guerra JL, Almendares O, Nolen LD, et al. Evaluation of Abbott BinaxNOW Rapid Antigen Test for SARS-CoV-2 Infection at Two Community-Based Testing Sites - Pima County, Arizona, November 3-17, 2020MMWR Morb Mortal Wkly Rep **2021**; 70(3): 100-5.



The inability to isolate virus from a clinical sample should not be interpreted to mean a person is not infectious and incapable of transmission

Limitations

- Nasal swabs were used for BinaxNOW antigen testing, but NP swabs were used for real-time RT-PCR testing
- COVID-19 symptoms are non-specific and difficult to capture
- Results not generalizable to other SARS-CoV-2 antigen tests

Discussion


DEPARTMENT OF HEALTH & HUMAN SERVICES USA
CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Results summary

- The faster turnaround time of the antigen test, compared to rRT-PCR, is beneficial because it allows for rapidly identifying persons for isolation.

- BinaxNOW antigen test sensitivity was lower in asymptomatic than symptomatic persons (35.8% versus 64.2%), but specificity was high.

- Sensitivity was higher among viral culture positive samples, however some antigen test-negative samples also had culturable virus.

Takeaway Messages

Antigen test results may need confirmatory testing

https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antigen-tests-guidelines.html#evaluating-test-results

Despite lower sensitivity, the faster results from point of care antigen tests can lead to more rapid isolation of COVID-19 cases

COVID-19 Viral Testing Tool is an interactive web tool designed to help both healthcare providers and individuals understand COVID-19 testing options.

https://www.cdc.gov/coronavirus/2019-ncov/testing/index.html

Acknowledgements

- **Pima County Health Department**
  - Theresa Cullen
  - Julie Kudrna
  - Khalilullah Sheiban
- **Arizona Department of Health Services**
  - Ken Komatsu
  - Ariella Dale
- **CDC State, Tribal, Local and Territorial Task Force**
  - William Bower
  - Peggy Honein
  - Mark Anderson
  - Julie Villanueva
  - Dale A. Rose

CDC Laboratory Task Force

- Paul Rota
- Natalie Thornburg
- Azaibi Tamin
- Jennifer Harcourt
- Ren Salerno
- Wendi Kuhnert-Tallman
- TLR Lab members

CDC Epidemiology Task Force

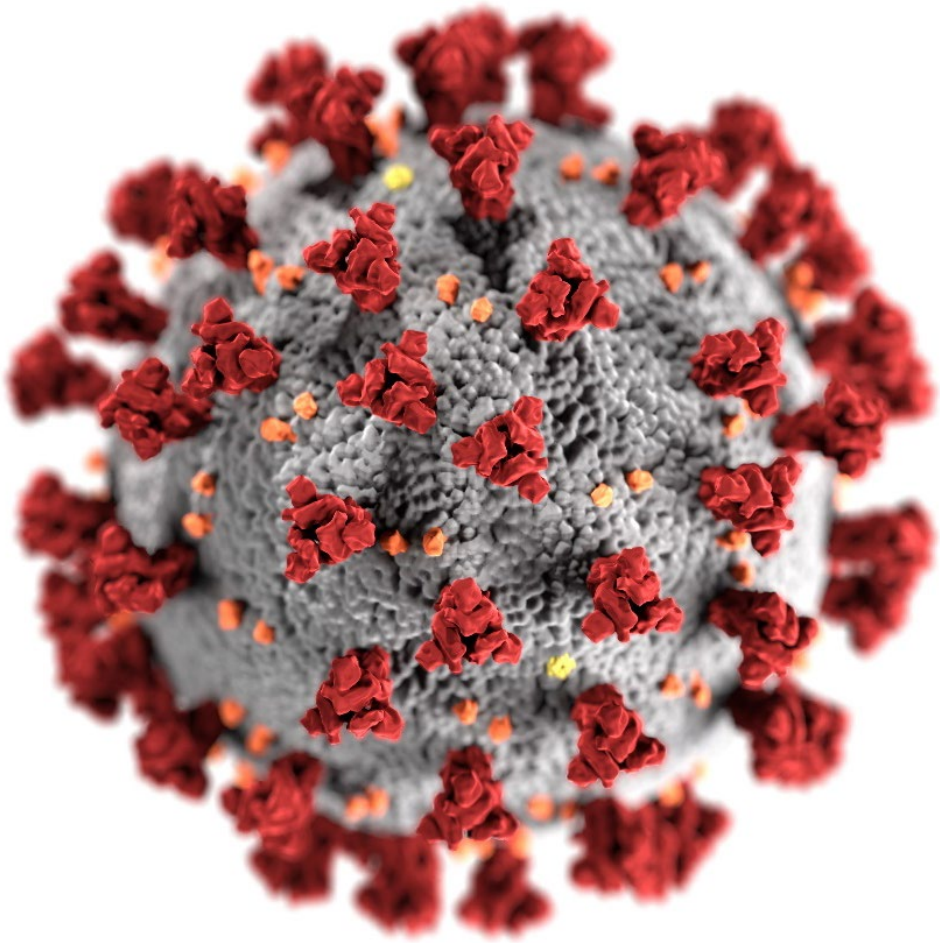
- Olivia Almendares
- Hannah Kirking
- Jackie Tate

CDC Arizona Field Team

Participants

Thank-you

Questions?



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

The TRUU-Lab Names Initiative: Towards Standardization, Interoperability and Understanding

Ila Singh, MD, PhD

Chief of Laboratory Medicine
Chief of Pathology Informatics
Texas Children's Hospital
Professor, Baylor College of Medicine

Texas Children's Hospital

Baylor College of Medicine

TRUU-Lab
Test Renaming for Understanding & Utilization

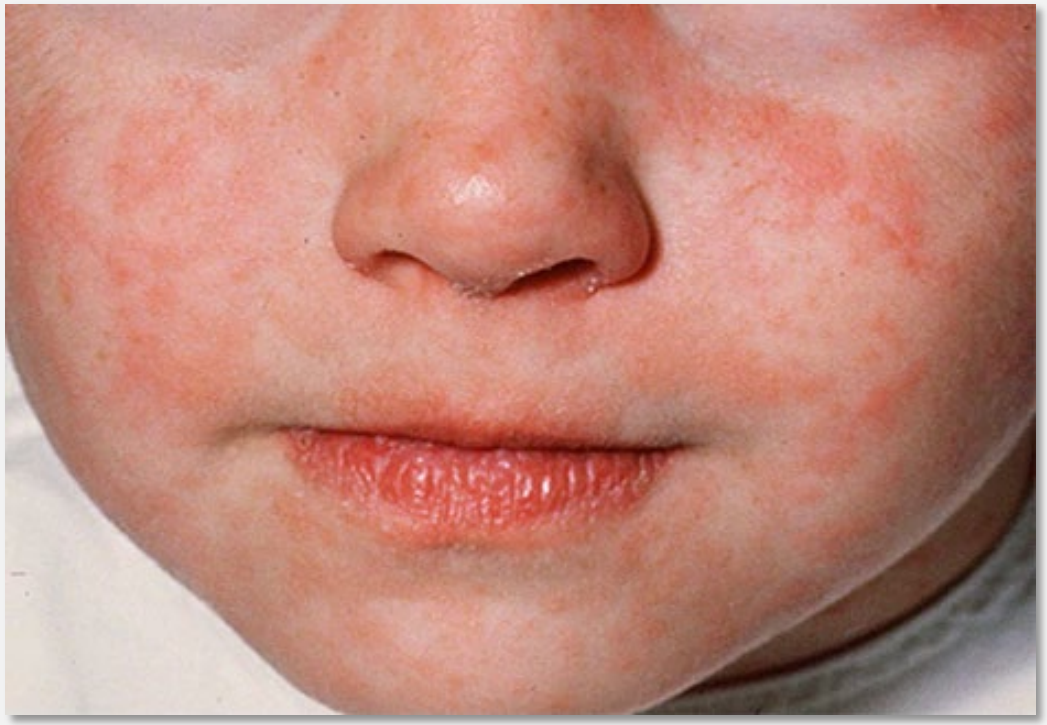
Today's Talk

- TRUU-Lab and Goals
- What we have done:
  - Identified & Categorized Common Problematic Names
  - Finished First Surveys of 200 Clinicians
  - Gone Live with Second Survey
- Yet to Come – in brief

- Not - about what has been previously covered
  - Why Naming Problems Exist
  - Safety Issues related to Names
  - Current Practices to Address 'bad' Names
  - Other Naming Practices or Attempts

No Conflicts of Interest

A Case of Measles …No Lab Test?



Pic: Mayo Foundation for Medical Education and Research

Test found in EMR

Rubeola IgM

TRUU-Lab

Aims to bring together

- Healthcare Providers,
- Professional Societies,
- Industry Groups, and
- Federal Liaisons

to address problems caused by ambiguous, incomplete, and non-standard laboratory test names

TRUU-Lab's Goals

- Generate consensus names for existing lab tests
- Generate a consensus guideline for test naming
- Promote the adoption and implementation of consensus lab test names and guidelines

TRUU-Lab Members

AACC
- Sridevi Devaraj, PhD

AAFP
- Keith Davis, md

ACLPS
- Neal Lindeman, MD

AMP
- Rick Nolte, PhD
- Mary Williams
- Robin Temple-Smolkin

API
- Monica de Baca, MD
- David McClintock, MD

ASCP Choosing Wisely
- Lee Hilborne, MD
- Iman Kundu, Edna Garcia

ASM
- Laura Filkins, PhD

CAP
- Peter Perrotta, MD

EMR/LIS/Terminology Groups
- Nick Trentadue (Epic)
- Jigar Patel, MD (Cerner)
- Jeff Watson (Sunquest)
- Amanda Caudle (Atlas/Sunquest)
- Holly van Kleeck JD (Health Language)
- Dale Davidson (Health Language)
- Nancy Sokol (UpToDate)
- Cheryl Mason
- Steve Box (X-Lab Systems, UK)

LOINC
- Jami Deckard

Nudge Unit
- Mitesh Patel MD, PhD, MBA

PLUGS
- Mike Astion, MD, PhD
- Jane Dickerson, PhD

Reference Labs
- Brian Jackson, MD, MS (ARUP)
- Lee Hilborne, MD, PhD (Quest)
- Mohamed Salama MD (Mayo)

Commercial
- Kara Johnson (Abbott)
- Ross Molinaro MD (Siemens)
- Daniel Johnson (Sysmex)
- Jeff Schreier (Diaceutics)
- Jon Nakamoto, MD, PhD (Amazon)

Clinical Pathologists and Scientists
- Ila Singh (Texas Children's/Baylor)
- Emily Garnett, PhD (Texas Children's/Baylor)
- Laura Filkins (UT, Southwestern)
- Grace Kroner, PhD (Cleveland Clinic)
- Gary Procop MD (American Board of Pathology)
- Charlene Bierl, MD, PhD (Penn)
- Swapna Abhayankar MD (Regenstrief)
- Elissa Passiment, PhD
- Michael Laposata MD, PhD (UTMB)
- Anand Dighe, MD, PhD (MGH/Harvard)
- David Alter (Emory U)
- Sam McCash (Memorial Sloan Kettering)
- Andrea Pitkus

Federal Liaisons

CDC
FDA
- Sara Brenner
- Greg Pappas

ONC
- Talisha Searcy

CMS
- Serafina Brea

International Partners

National Health Service
United Kingdom

Standardization in Pharmacologic/ Toxicology Testing
Norway

Royal College of Pathologists of Australasia
Sydney, Australia

Brazil Association of LIS Directors
Sao Paulo, Brazil

The Office of the National Coordinator for Health Information Technology

CDC

Jasmine Chaitram
Nancy Cornish
Maribeth Gagnon
Reynolds Salerno

Param Sandhu
Monica Toles

Lack of Standardization in Test Names

Vitamin D 25 hydroxy 1,25 dihydroxy	Thalassemia Screen Hemoglobin Variant Reflexive Panel Hemoglobin A2	eGFR vs EGFR SM Ab (Smith or Smooth muscle?)	Vasopressin Antidiuretic hormone (ADH) Arginine Vasopressin (AV)	Quantiferon Gold and Interferon-Gamma Release assay (TB)
Factor V Leiden Vs Factor V Levels	Hemoglobin A1c Glycated hemoglobin A1c	Free LC/MS-MS	Character limits Respiratory Virus Panels Celiac algorithm	Human Chorionic Gonadotrophin for Pregnancy vs Tumor Marker

TRUU-LAB Sub-Committee Dr. Gary Procop

Creating ‘Good’ Names

Traditionally - Names are chosen by Lab Directors *without* input from people who use them

Let’s ask the people who use the names, i.e. clinicians of all kinds

Clinician’s idea of a ‘good’ name is colored by their own experiences – good or bad

Experiences vary an enormous amount: **HIV RNA test (quantitative)**

- HIV-1, Quantitative, Real-Time PCR (Quest Diagnostics)
- HIV-1 RNA by Quantitative RT-PCR, Plasma (ARUP Laboratories)
- HIV 1 RNA NAA+probe, Log #/Vol (LOINC)
- HIV viral load PCR (Mass General Hospital

No one calls it an *AIDS* test (compare that with ‘COVID test’)

Survey Takers and the Brand Institute

Surveyed Clinicians from Specialties that order quite a few tests

Two surveys, Name Survey & FMEA survey, 100 clinicians each

- **20 Emergency Physicians**
- **20 Pediatricians**
- **20 Obstetrician-Gynecologists**
- **20 Family Practice and General Practice Physicians**
- **10 Nurse Practitioners**
- **10 Physician Assistants**

37% > 20 yr experience

42% with 10-20 years experience

BI ,i. BRAND INSTITUTE
Where Great Brands Begin!®

DSI DrugSafetyInstitute, inc.
A Subsidiary of BRAND INSTITUTE, inc.

Involved in naming >80% of Pharmaceutical Products in the world.

Both Generic and Brand Names.

Lab Names Survey

Two Structural Parts

1. Give a clinical scenario for which they choose appropriate Lab tests **Unaided Survey**

2. Provide background information about the test and *then* ask questions about what would make an ideal name **Aided Survey**

- Avoids provider responses that are driven by *prior* knowledge and experience
- Ensures providers are making *informed* decisions
- Reaches *intuitive* test names that we anticipate will be widely understandable

Unaided Survey

A 40-year old woman presents with fever and shortness of breath. She is not vaccinated against COVID-19. You would like to test her for potential SARS-CoV-2 infection.

Which of the tests listed below would you order?

Please rank up to three tests listed below that best communicate exactly what you want:

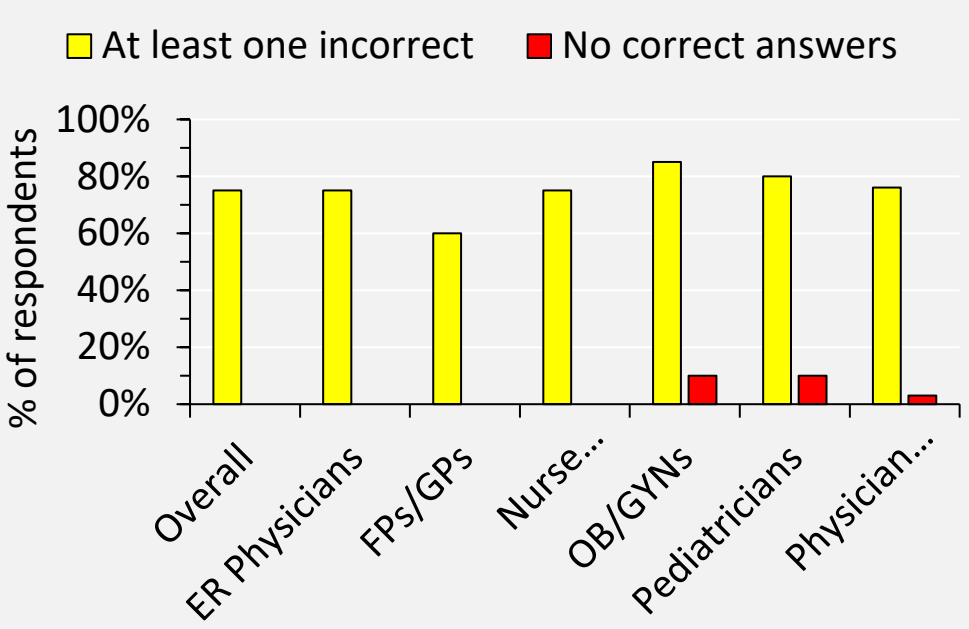
For the test that **best communicates what you want** select “1”
For **the second test that best communicates what you want** select “2”
For the **third test that best communicates what you want** select “3”

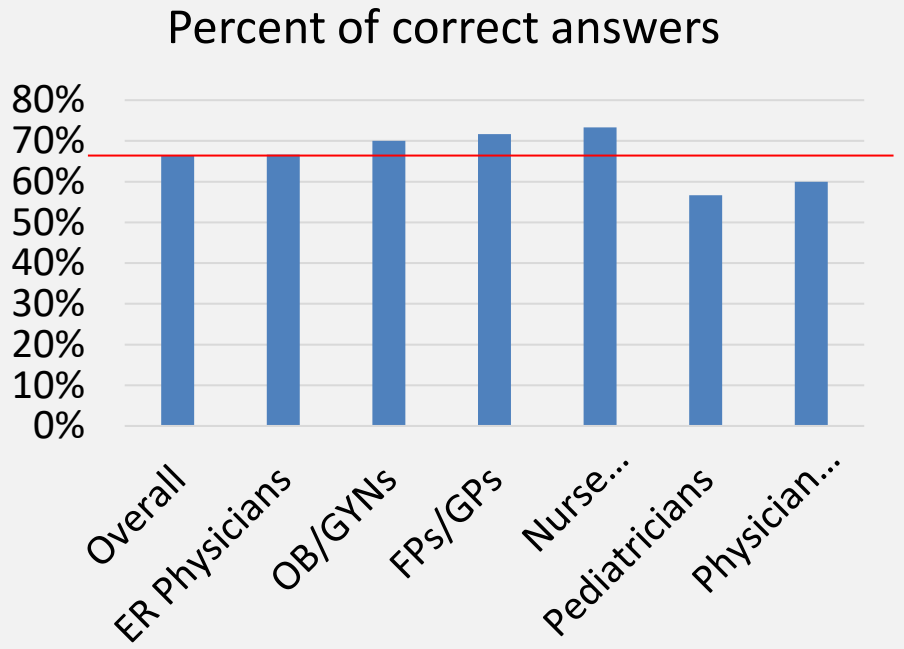
A number of choices with SARS-CoV-2 nucleic acid, antibodies, and antigens were provided.

Unaided Surveys

Vitamin D
Testosterone
Anti-Xa
SARS-CoV-2 RNA

SARS-CoV-2: Correct Test Choice same as by Chance

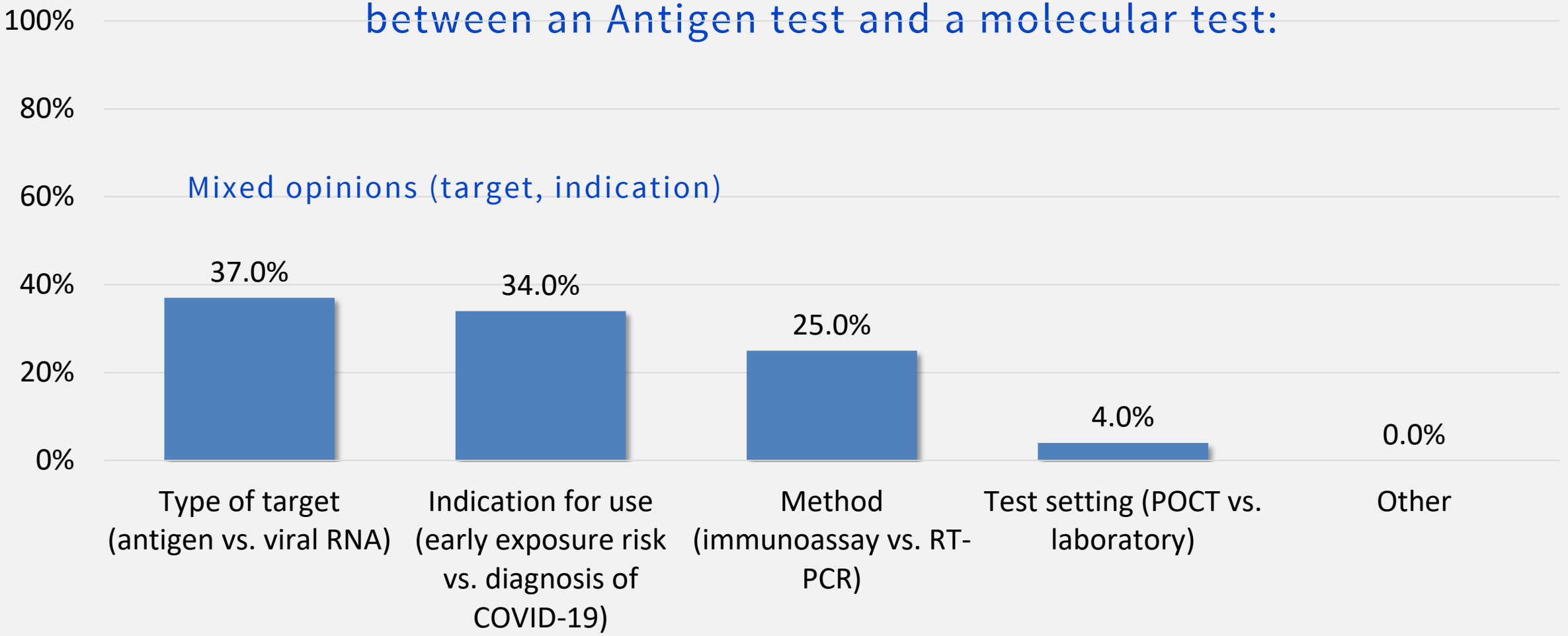




- 76% of all providers chose at least one incorrect test name (out of 3)
- **66% of selections were correct, equal to chance (66% of choices were correct)**
- Pediatricians and PAs did worse than chance
- 10% of OB-GYNs and Pediatricians chose only incorrect tests

Lab Test Names are really a problem!

What information in a test name would be most helpful to differentiate between an Antigen test and a molecular test:

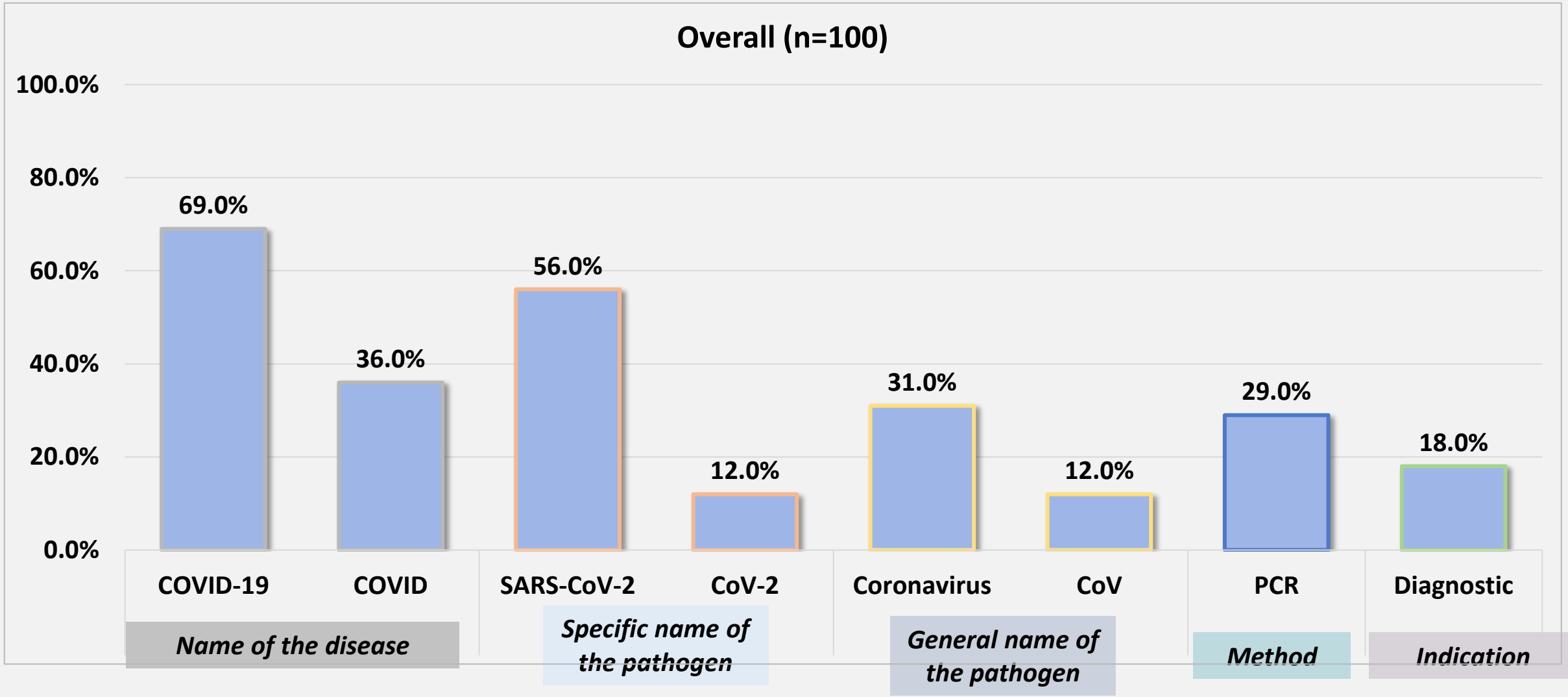


Texas Children's Hospital

Baylor College of Medicine

TRUU-Lab
Test Renaming for Understanding & Utilization

Preference for Keywords

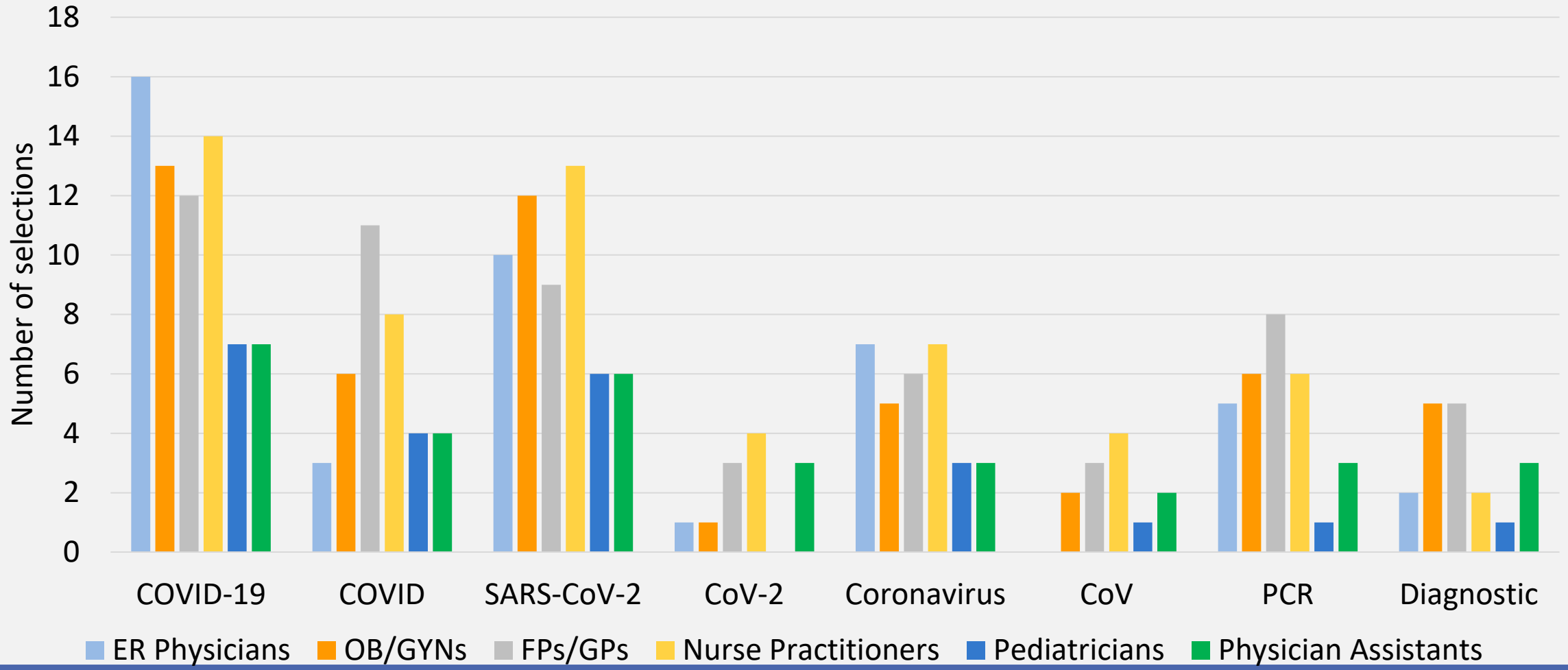


Texas Children's Hospital

Baylor College of Medicine

TRUU-Lab
Test Renaming for Understanding & Utilization

General Consensus among Specialties about Keywords



Texas Children's Hospital

Baylor College of Medicine

TRUU-Lab
Test Renaming for Understanding & Utilization

Lessons Learned

- Test Names are a Problem – respondents do not perform much better than chance. They need help!
- The most widely preferred types of information within names were “core identifiers” (i.e. the **name of the target**) and “utilization aids” (i.e. **indication for testing**)
- The “actual name of the target” was preferred for testosterone and Vitamin D, but the name of the disease (COVID-19) was more frequently chosen than SARS-CoV-2
- **Indications FOR use** were strongly preferred over **warnings AGAINST improper use** when both options were given
- For Vitamin D testing, where the target names are complex and the indications are complex too, warnings against inappropriate use were preferred
- There isn’t a ‘One Size Fits All’, but there are likely common patterns that will become clearer with subsequent surveys

We will use Results from these Surveys

to build General Guidelines for Test Naming

Test Before Widespread Implementation

- Present a Clinical Scenario within a Mock EMR
- Populate the Mock EMR with optimal as well as sub-optimal names. See what people choose.

Goal – Get these standardized names in the foundation build of all EMRs and LIS – Better Interoperability

Thank you!

CDC

- Jasmine Chaitram
- Nancy Cornish
- Maribeth Gagnon
- Reynolds Salerno
- Param Sandhu
- Monica Toles

Brand Institute

- Jacob Barnes
- Matthew Filbert
- Brian Frasca
- Luisanna Meija
- Carlos Gomez
- Minnie Suh
- Ricardo Montemayor

SARS-CoV-2 Variants Update

Natalie Thornburg
CDC Laboratory and Testing Task Force for the COVID-19 Response

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

FDA Update

Tim Stenzel
US Food and Drug Administration (FDA)

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

U.S. Food and Drug Administration (FDA)

- **COVID-19 Emergency Use Authorization (EUA) Information for Medical Devices**
  https://www.fda.gov/medical-devices/emergency-situations-medical-devices/emergency-use-authorizations
- **COVID-19 In Vitro Diagnostic EUAs**
  https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/vitro-diagnostics-euas
- **COVID-19 Frequently Asked Questions**
  https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/coronavirus-disease-2019-covid-19-frequently-asked-questions
- **COVID-19 Updates**
  https://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization#2019-ncov
- **FDA Townhall Meetings**
  https://www.fda.gov/medical-devices/workshops-conferences-medical-devices/virtual-town-hall-series-immediately-effect-guidance-coronavirus-covid-19-diagnostic-tests-06032020
- **Independent Evaluations of COVID-19 Serological Tests**
  https://open.fda.gov/apis/device/covid19serology/

FDA U.S. FOOD & DRUG ADMINISTRATION

U.S. Food and Drug Administration (FDA)

- **COVID-19 Diagnostic Development**
  CDRH-EUA-Templates@fda.hhs.gov

- **Spot Shortages of Testing Supplies: 24-Hour Support Available**
  1. Call 1-888-INFO-FDA (1-888-463-6332)
  2. Then press star (*)

- **FDA MedWatch**
  https://www.fda.gov/safety/medwatch-fda-safety-information-and-adverse-event-reporting-program

U.S. FOOD & DRUG ADMINISTRATION

CDC Social Media

https://www.facebook.com/CDC

https://twitter.com/cdcgov

https://www.instagram.com/cdcgov

https://www.linkedin.com/company/cdc

Thank You For Your Time!

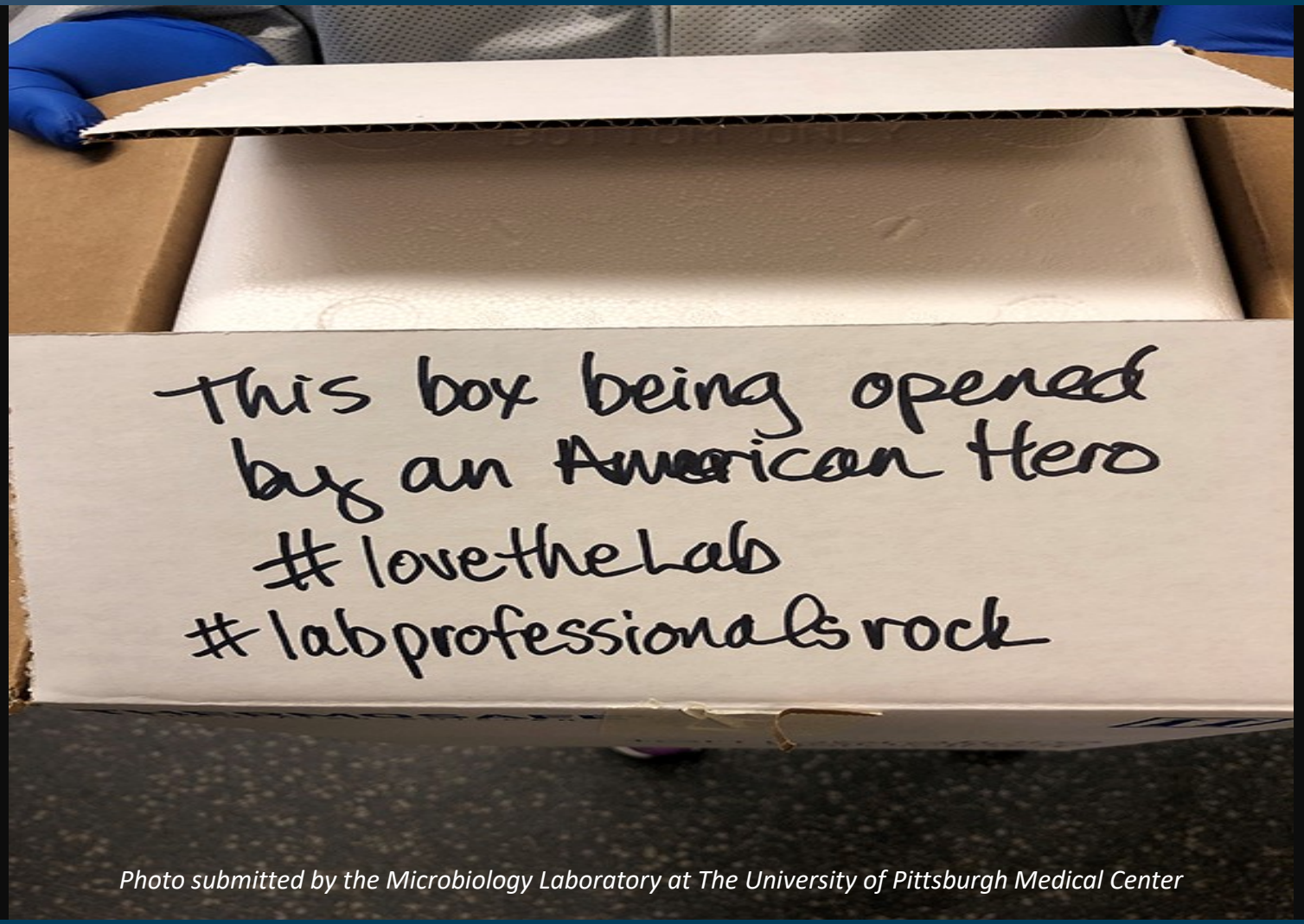


Photo submitted by the Microbiology Laboratory at The University of Pittsburgh Medical Center